5.16 Worker Health and Safety

5.16.1 Introduction

The Applicant proposes to develop a solar energy project called the Ivanpah Solar Electric Generating System (Ivanpah SEGS). It will be located in southern California's Mojave Desert, near the Nevada border, to the west of Ivanpah Dry Lake. The project will be located in San Bernardino County, California, on federal land managed by the Bureau of Land Management (BLM). It will be constructed in three phases: two 100-megawatt (MW) phases (known as Ivanpah 1 and 2) and a 200-MW phase (Ivanpah 3). The phasing is planned so that Ivanpah 1 (the southernmost site) will be constructed first, followed by Ivanpah 2 (the middle site), then Ivanpah 3 (the 200-MW plant on the north), though the order of construction may change. Each 100-MW site requires about 850 acres (or 1.3 square miles); the 200-MW site is about 1,660 acres (or about 2.6 square miles). The total area required for all three phases, including the Administration/Operations and Maintenance building and substation, is approximately 3,400 acres. The Applicant has applied for a right-of-way grant for the land from BLM. Although this is a phased project, it is being analyzed as if all phases are operational.

The heliostat (or mirror) fields focus solar energy on the power tower receivers near the center of each of the heliostat arrays (the 100-MW plants have three arrays and the 200-MW plant has four arrays). In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers and reheat steam from one solar reheater—located in the power block at the top of its own tower. The solar field and power generation equipment are started each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required to keep the turbine online.

Ivanpah 1, 2 and 3 will be interconnected to the Southern California Edison (SCE) grid through upgrades to SCE's 115-kilovolt (kV) line passing through the site on a northeast-southwest right-of-way. These upgrades will include the construction by SCE of a new 220/115-kV breaker-and-a-half substation between the Ivanpah 1 and 2 project sites. This new substation and the 220-kV upgrades will be for the benefit of Ivanpah and other Interconnection Customers in the region. The existing 115-kV transmission line from the El Dorado substation will be replaced with a double-circuit 220-kV overhead line that will be interconnected to the new substation. Power from Ivanpah 1, 2 and 3 will be transmitted at 115 kV to the new substation. SCE plans to add three new 115-kV lines to increase capacity to the existing El Dorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115-kV line heading southwest. The timing of this upgrade depends upon the development of wind projects ahead in the queue, and is not affected by the Ivanpah SEGS project.

Each phase of the project includes a small package natural gas-fired start-up boiler to provide heat for plant start-up and during temporary cloud cover. The project's natural gas system will be connected to the Kern River Gas Transmission Line, which passes less than half a mile to the north of the project site. Raw water will be drawn daily from one of two onsite wells, located east of Ivanpah 2. Each well will have sufficient capacity to supply water for all three phases. Groundwater will go through a treatment system for use as boiler make-up water and to wash the heliostats. To save water in the site's desert environment, each plant will use a dry-cooling condenser. Water consumption is, therefore, minimal

(estimated at no more than 100 acre-feet/year for all three phases). Each phase includes a small onsite wastewater plant located in the power block that treats wastewater from domestic waste streams such as showers and toilets. A larger sewage package treatment plant will also be located at the Administration Building/Operations and Maintenance area, located between Ivanpah 1 and 2. Sewage sludge will be removed from the site by a sanitary service provider. No wastewater will be generated by the system, except for a small stream that will be treated and used for landscape irrigation. If necessary, a small filter/purification system will be used to provide potable water at the Administration Building.

This subsection contains worker health and safety information including the laws, ordinances, regulations, and standards (LORS) that apply to this project along with specific sections outlining the safety training programs and general health and safety programs that will be prepared and implemented for this project, the methods to control the anticipated hazards, fire protection information, and general information on permitting agencies and contacts.

5.16.2 Laws, Ordinances, Regulations, and Standards

Construction and operation of Ivanpah SEGS will be conducted in accordance with all applicable LORS. Table 5.16-1 summarizes the federal, state, and local LORS relating to worker health and safety. Table 5.16-2 provides a summary of the applicable national consensus standards.

TABLE 5.16-1
Laws, Ordinances, Regulations, and Standards Applicable for Ivanpah SEGS Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
Federal	
Title 29 Code of Federal Regulations (CFR) Part 1910*	Contains the minimum occupational safety and health standards for general industry in the United States
Title 29 CFR Part 1926	Contains the minimum occupational safety and health standards for the construction industry in the United States
State	
California Occupational Safety and Health Act, 1970	Establishes minimum safety and health standards for construction and general industry operations in California
8 California Code of Regulations (CCR) 339	Requires list of hazardous chemicals relating to the Hazardous Substance Information and Training Act
8 CCR 450	Addresses hazards associated with pressurized vessels
8 CCR 750	Addresses hazards associated with high-pressure steam
8 CCR 1509	Addresses requirements for construction, accident, and prevention plans
8 CCR 1509, et seq., and 1684, et seq.	Addresses construction hazards, including head, hand, and foot injuries and noise and electrical shock
8 CCR 1528, et seq., and 3380, et seq.	Requirements for personal protective equipment (PPE)
8 CCR 1597, et seq., and 1590, et seq.	Requirements addressing the hazards associated with traffic accidents and earth-moving

TABLE 5.16-1
Laws, Ordinances, Regulations, and Standards Applicable for Ivanpah SEGS Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
8 CCR 1604, et seq.	Requirements for construction hoist equipment
8 CCR 1620, et seq., and 1723, et seq.	Addresses miscellaneous hazards
8 CCR 1709, et seq.	Requirements for steel reinforcing, concrete pouring, and structural steel erection operations
8 CCR 1920, et seq.	Requirements for fire protection systems
8 CCR 2300, et seq., and 2320, et seq.	Requirements for addressing low-voltage electrical hazards
8 CCR 2395, et seq.	Addresses electrical installation requirements
8 CCR 2700, et seq.	Addresses high-voltage electrical hazards
8 CCR 3200, et seq., and 5139, et seq.	Requirements for control of hazardous substances
8 CCR 3203, et seq.	Requirements for operational accident prevention programs
8 CCR 3270, et seq., and 3209, et seq.	Requirements for evacuation plans and procedures
8 CCR 3301, et seq.	Requirements for addressing miscellaneous hazards, including hot pipes, hot surfaces, compressed air systems, relief valves, enclosed areas containing flammable or hazardous materials, rotation equipment, pipelines, and vehicle-loading dock operations.
8 CCR 3360, et seq.	Addresses requirements for sanitary conditions
8 CCR 3511, et seq., and 3555, et seq.	Requirements for addressing hazards associated with stationary engines, compressors, and portable, pneumatic, and electrically powered tools
8 CCR 3649, et seq., and 3700, et seq.	Requirements for addressing hazards associated with field vehicles
8 CCR 3940, et seq.	Requirements for addressing hazards associated with power transmission, compressed air, and gas equipment
8 CCR 5109, et seq.	Requirements for addressing construction accident and prevention programs
8 CCR 5110, et. seq.	Requirements for the implementation of an ergonomics program
8 CCR 5139, et seq.	Requirements for addressing hazards associated with welding, sandblasting, grinding, and spray-coating
8 CCR 5150, et seq.	Requirements for confined space entry
8 CCR 5160, et seq.	Requirements for addressing hot, flammable, poisonous, corrosive, and irritant substances
8 CCR 5192, et seq.	Requirements for conducting emergency response operations
8 CCR 5194, et seq.	Requirements for employee exposure to dusts, fumes, mists, vapors, and gases
8 CCR 5405, et seq.; 5426, et seq.; 5465, et seq.; 5500, et seq.; 5521, et seq.; 5545, et seq.; 5554, et seq.; 5565,	Requirements for flammable liquids, gases, and vapors

TABLE 5.16-1
Laws, Ordinances, Regulations, and Standards Applicable for Ivanpah SEGS Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
et seq.; 5583, et seq.; and 5606, et seq.	
8 CCR 5583, et seq.	Requirements for design, construction, and installation of venting, diking, valving, and supports
8 CCR 6150, et seq.; 6151, et seq.; 6165, et seq.; 6170, et seq.; and 6175, et seq.	Provides fire protection requirements
24 CCR 3 et seq.	Incorporates current addition of Uniform Building Code
8 CCR, Part 6	Provides health and safety requirements for working with tanks and boilers
Health and Safety Code Section 25500, et seq.	Requires that every new or modified facility that handles, treats, stores, or disposes of more than the threshold quantity of any of the listed acutely hazardous materials prepare and maintain a Risk Management Plan (RMP)
Health and Safety Code Sections 25500 through 25541	Requires the preparation of a Hazardous Material Business Plan (HMBP) that details emergency response plans for a hazardous materials emergency at the facility
Local	
Specific hazardous material handling requirements	Provides response agencies with necessary information to address emergencies
Emergency Response Plan	Allows response agency to integrate Ivanpah SEGS emergency response activities into any response actions
Business Plan	Provides response agency with overview of Ivanpah SEGS purpose and operations
Risk Management Plan (Certified Unified Program Agency)	Provides response agency with detailed review of risks and hazards located at Ivanpah SEGS and mitigation implemented to control risks or hazards.

TABLE 5.16-2
Applicable National Consensus Standards for Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
Uniform Fire Code, Article 80	Addresses the prevention, control, and mitigation of dangerous conditions related to storage, dispensing, use, and handling of hazardous materials and information needed by emergency response personnel
National Fire Protection Association (NFPA) 10, Standard for Portable Fire Extinguishers	Requirements for selection, placement, inspection, maintenance, and employee training for portable fire extinguishers
NFPA 11, Standard for Low-Expansion Foam and Combined Agent Systems	Requirements for installation and use of low-expansion foam and combined-agent systems
NFPA 11A, Standard for Medium- and High-Expansion Foam Systems	Requirements for installation and use of medium- and high-expansion foam systems
NFPA 12, Standard on Carbon Dioxide Extinguishing Systems	Requirements for installation and use of carbon dioxide extinguishing systems

TABLE 5.16-2
Applicable National Consensus Standards for Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
NFPA 13, Standard for Installation of Sprinkler Systems	Guidelines for selection and installation of fire sprinkler systems
NFPA 13A, Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems	Guidance for inspection, testing, and maintenance of sprinkler systems
NFPA 14, Standard for the Installation of Standpipe and Hose Systems	Guidelines for selection and installation of standpipe and hose systems
NFPA 15, Standard for Water Spray Fixed Systems	Guidelines for selection and installation of water spray fixed systems
NFPA 17, Standard for Dry Chemical Extinguishing Systems	Guidance for selection and use of dry chemical extinguishing systems
NFPA 20, Standard for the Installation of Centrifugal Fire Pumps	Guidance for selection and installation of centrifugal fire pumps
NFPA 22, Standard for Water Tanks for Private Fire Protection	Requirements for water tanks for private fire protection
NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances	Requirements for private fire service mains and their appurtenances
NFPA 26, Recommended Practice for the Supervision of Valves Controlling Water Supplies	Supervision guidance for valves controlling water supplies
NFPA 30, Flammable and Combustible Liquid Code	Requirements for storage and use of flammable and combustible liquids
NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	Fire protection requirements for installation and use of combustion engines and gas turbines
NFPA 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites	Fire protection requirements for hydrogen systems
NFPA 54, National Fuel Gas Code	Fire protection requirements for use of fuel gases
NFPA 59A, Standard for the Storage and Handling of Liquefied Petroleum Gases	Requirements for storage and handling of liquefied petroleum gases
NFPA 68, Guide for Explosion Venting	Guidance in design of facilities for explosion venting
NFPA 70, National Electric Code	Guidance on safe selection and design, installation, maintenance, and construction of electrical systems
NFPA 70B, Recommended Practice for Electrical Equipment Maintenance	Guidance on electrical equipment maintenance
NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces	Employee safety requirements for working with electrical equipment
NFPA 71, Standard for the Installation, Maintenance, and Use of Central Station Signaling Systems	Requirements for installation, maintenance, and use of central station signaling systems
NFPA 72A, Standard for the Installation, Maintenance and Use of Local Protective Signaling Systems for Guard's Tour, Fire Alarm and Supervisory Service	Requirements for installation, maintenance, and use of local protective signaling systems
NFPA 72E, Standard on Automatic Fire Detection	Requirements for automatic fire detection

TABLE 5.16-2
Applicable National Consensus Standards for Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
NFPA 72F, Standard for the Installation, Maintenance and Use of Emergency Voice/Alarm of Communication Systems	Requirements for installation, maintenance, and use of emergency and alarm communications systems
NFPA 72H, Guide for Testing Procedures for Local, Auxiliary, Remote Station and Proprietary Protective Signaling Systems	Testing procedures for types of signaling systems anticipated for facility
NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment	Requirements for fire protection systems used to protect computer systems
NFPA 78, Lightning Protection Code	Lightning protection requirements
NFPA 80, Standard for Fire Doors and Windows	Requirements for fire doors and windows
NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems	Requirements for installation of air conditioning and ventilating systems
NFPA 101, Code for Safety to Life from Fire in Buildings and Structures	Requirements for design of means of exiting the facility
NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants	Guidelines for testing and marking of fire hydrants
NFPA 850, Recommended Practice for Fire Protection for Fossil Fuel Steam Electric Generating Plants	Requirements for fire protection in fossil-fuel steam electric generating plants and alternative fuel electric generating plants
NFPA 1961, Standard for Fire Hose	Specifications for fire hoses
NFPA 1962, Standard for the Care, Maintenance, and Use of Fire Hose Including Connections and Nozzles	Requirements for care, maintenance, and use of fire hose
NFPA 1963, Standard for Screw Threads and Gaskets for Fire Hose Connections	Specifications for fire hose connections
American National Standards Institute/American Society for Mechanical Engineers (ANSI/ASME), Boiler and Pressure Vessel Code	Specifications and requirements for pressure vessels
ANSI, B31.2, Fuel Gas Piping	Specifications and requirements for fuel gas piping

5.16.3 Affected Environment

Ivanpah SEGS construction will take place in three phases. It is anticipated that the construction period for Ivanpah SEGS will take place from the first quarter 2009 through the fourth quarter 2012.

It is anticipated that most (95 percent) of the construction workforce will be drawn from Clark County, Nevada while the remaining (5 percent) will be drawn from San Bernardino County. The primary trades in demand will include pipefitters, electricians, construction managers, ironworkers, laborers, pre-assembly, carpenters, and unskilled labor.

5.16.4 Health and Safety Programs

5.16.4.1 Environmental Checklist

Impacts would generally be evaluated with respect to the California Environmental Quality Act (CEQA) checklist. The CEQA checklist does not have specific questions for worker health and safety. Related questions are addressed in the Hazardous Materials Management and Noise checklists.

5.16.4.2 Hazard Analysis

During this project, the workers will be exposed to construction safety and operation hazards. A hazard analysis has been prepared to evaluate the project hazards and control measures. The analysis identifies the hazards anticipated during construction and operation and indicates which safety programs should be developed and implemented to mitigate and appropriately manage those hazards. The hazard analysis prepared for construction activities is outlined in Table 5.16-3 and the hazard analysis prepared for plant operation is outlined in Table 5.16-4. Since the types of hazards anticipated during plant construction and operation are similar, there is considerable duplication between the tables.

TABLE 5.16-3
Construction Hazard Analysis

Activity	Hazard*	Control*
Motor vehicle and heavy equipment use	Employee injury and property damage from collisions between people and equipment	Motor Vehicle and Heavy Equipment Safety Program
Forklift operation	Same as heavy equipment	Forklift Operation Program
Trenching and excavation	Employee injury and property damage from the collapse of trenches and excavations	Excavation/Trenching Program
Working at elevated locations	Falls from the same level and elevated areas	Fall Prevention Program Scaffolding/Ladder Safety Program Articulating Boom Platforms Program
Use of cranes and derricks	Property damage from falling loads; employee injuries from falling loads; and injuries and property damage from contact with crane or derrick	Crane and Material Handling Program
Working with flammable and combustible liquids	Fire/spills	Fire Protection and Prevention Program; Housekeeping and Material Handling and Storage Program
Hot work (including cutting and welding)	Employee injury and property damage from fire; exposure to fumes during cutting and welding; ocular exposure to ultraviolet and infrared radiation during cutting and welding	Hot Work Safety Program; Respiratory Protection Program; Employee Exposure Monitoring Program; Personal Protective Equipment Program
Inspection and maintenance of temporary systems used during construction activities	Employee injury and property damage from contact with hazardous energy sources (electrical, thermal, mechanical,	Electrical Safety Program

TABLE 5.16-3
Construction Hazard Analysis

Activity	Hazard*	Control*
	etc.)	
Working on electrical equipment and systems	Employee contact with live electricity and energized equipment	Electrical Safety Program; Personal Protective Equipment Program
Exposure to Hazardous Waste	Personnel who are working with or have the potential to be exposed to contaminated soil, groundwater, or debris during construction	Hazardous Waste Program
Confined space entry	Employee injury from physical and chemical hazards	Permit-Required Confined-Space Entry Program
General construction activity	Employee injury from hand and portable power tools	Hand and Portable Power Tool Safety Program; Personal Protective Equipment Program
General construction activity	Employee injury/property damage from inadequate walking and work surfaces	Housekeeping and Material Handling and Storage Program
General construction activity	Employee exposure to occupational noise	Hearing Conservation Program Personal Protective Equipment Program
General construction activity	Employee injury from improper lifting and carrying of materials and equipment	Back Injury Prevention Program
General construction activity	Employee injury to head, eye/face, hand, body, foot, and skin	Personal Protective Equipment Program
General construction activity	Employee exposure to hazardous gases, vapors, dusts, liquids, and fumes	Hazard Communication Program; Respiratory Protection Program; Personal Protective Equipment Program; Air Monitoring Program
General construction activity	Employee exposure to various hazards; reporting of hazardous conditions during construction	Injury and Illness Prevention Program
General construction activity	Heat and cold stress	Heat and Cold Stress Monitoring and Control Program
Construction and testing of high-pressure steam and air systems	Employee injury and property damage due to failure of pressurized system components or unexpected release of pressure	Pressure Vessel and Pipeline Safety Program; Electrical Safety Program

* The hazards and hazard controls provided are generic to construction activities. During various phases of construction, a hazard analysis will be performed to evaluate the hazards and develop appropriate controls.

TABLE 5.16-4
Operation Hazard Analysis

Activity	Hazard*	Control*
Motor vehicle and heavy equipment use	Employee injury and property damage from collisions between people and equipment	Motor Vehicle and Heavy Equipment Safety Program

TABLE 5.16-4
Operation Hazard Analysis

Activity	Hazard*	Control*
Forklift operations	Same as heavy equipment	Forklift Operation Program
Trenching and excavation	Employee injury and property damage from the collapse of trenches and excavations	Excavation/Trenching Program
Working at elevated locations	Falls from the same level and elevated areas	Fall Protection Program; Scaffolding/Ladder Safety Program
Use of cranes or derricks	Property damage from falling loads, employee injuries from falling loads, injuries and property damage from contact with crane or derrick	Crane and Material Handling Program
Working with flammable and combustible liquids	Fire/spills	Fire Protection and Prevention Program
Working with hazardous materials	Employee injury due to ingestion, inhalation, dermal contact	Hazard Communication Program
Hot work (including cutting and welding)	Employee injury and property damage from fire; exposure to fumes during cutting and welding; ocular exposure to ultraviolet and infrared radiation during cutting and welding	Hot Work Safety Program; Respiratory Protection Program; Employee Exposure Monitoring Program; Personal Protective Equipment Program; Fire Protection and Prevention Program
Troubleshooting and maintenance of plant systems and general operational activities	Employee injury and property damage from contact with hazardous energy sources (electrical, thermal, mechanical, etc.)	Electrical Safety Program
Working on electrical equipment and systems	Employee contact with live electricity	Electrical Safety Program; Personal Protective Equipment Program
Confined space entry	Employee injury from physical and chemical hazards	Permit-Required Confined-Space Entry Program
General plant operation activities	Employee injuries from hand and portable power tools	Hand and Portable Power Tool Safety Program; Personal Protective Equipment Program
General plant operation activities	Employee injury and property damage from inadequate walking and work surfaces	Housekeeping and Material Handling and Storage Program
General plant operation activities	Employee overexposure to occupational noise	Hearing Conservation Program; Personal Protective Equipment Program
General plant operation activities	Employee injury from improper lifting and carrying of materials and equipment	Back Injury Prevention Program
General plant operation activities	Employee injury and property damage from unsafe driving	Safe Driving Program
General plant operation activities	Employee overexposure to hazardous gases, vapors, dusts, liquids, and fumes	Hazard Communication Program; Respiratory Protection Program; Personal Protective Equipment Program; Employee Exposure Monitoring Program

TABLE 5.16-4
Operation Hazard Analysis

Activity	Hazard*	Control*
General plant operation activities	Reporting and repair of hazardous conditions	Injury and Illness Prevention Program
General plant operation activities	Heat and cold stress	Heat and Cold Stress Monitoring and Control Program
General plant operation activities	Ergonomic injuries	Ergonomic Awareness Program
Maintenance and repair of high-pressure steam and air systems	Employee injury and property damage due to failure of pressurized system components or unexpected release of pressure	Pressure Vessel and Pipeline Safety Program; Electrical Safety Program

* The hazard and hazard controls provided are generic to operational activities. This hazard analysis may have to be updated if plant operations change or new equipment is added that was not considered during this evaluation.

5.16.4.3 Overview of Hazards and Related Programs and Training

Programs are overall plans that set forth the method or methods that will be followed to achieve particular health and safety objectives. For example, the Fire Protection and Prevention Program will describe what has to be done to protect against and prevent fires. This will include equipment required, such as alarm systems and firefighting equipment, and procedures to protect against fires. The Emergency Action Program/Plan will describe escape procedures, rescue and medical procedures, alarm and communication systems, and response procedures for very hazardous materials that can migrate. The programs or plans are contained in written documents that are usually kept at specific locations within the facility.

Each program or plan will contain training requirements that are translated into detailed training courses. These courses are taught to plant construction and operating personnel, as needed. For example, all plant operating personnel will receive training in escape procedures under the Emergency Action Program/Plan, but only those working with flammables will receive training under the Fire Protection and Prevention Program.

Tables 5.16-3 and 5.16-4, which list construction and operation activities and associated hazards, also show (under the "Control" column) the program designed to reduce the occurrence of each hazard.

5.16.4.4 Health and Safety Programs

To protect the safety and health of workers during the construction and operation of Ivanpah SEGS, health and safety programs designed to mitigate hazards and comply with applicable regulations will be implemented. Periodic audits will be performed by qualified individuals to determine whether proper work practices are being used to mitigate hazardous conditions and to evaluate regulatory compliance.

The following subsections contain information on the anticipated content of the health and safety programs.

5.16.4.4.1 Construction Health and Safety Program

The following construction safety programs will be developed and implemented during construction of the Ivanpah SEGS, as outlined in the following lists.

Injury and Illness Prevention Program

- Philosophy and safety commitment
- Safety leadership and responsibilities
- Accountability
- Specific core safety processes (see Construction Safety Programs later in this section)
- Employee communication
- Planning "job hazard analysis and pre-task"
- Compliance with work rules and safe work practices
- Measurement of compliance and effectiveness of prevention methods
- Communication of performance and implementation of necessary improvements
- Training and other communication requirements

Fire Protection and Prevention Program

- General requirements
- Housekeeping and proper material storage
- Employee alarm/communication system
- Portable fire extinguishers
- Fixed firefighting equipment
- Fire control and containment
- Flammable and combustible liquid storage
- Use of flammable and combustible liquids
- Dispensing and disposal of flammable liquids
- Service and refueling areas
- Training

Personal Protective Equipment Program

- Personal protective devices
- Head protection
- Eye/face protection
- Body protection
- Hand protection
- Foot protection
- Skin protection
- Fall protection
- High-voltage protection
- Respiratory protection
- Hearing protection
- Hazard analysis
- Training

Emergency Action Program/Plan

Emergency procedures for the protection of personnel, equipment, the environment, and materials:

- Fire and emergency reporting procedures
- Response actions for accidents involving personnel and or property
- Bomb threats
- Site assembly and emergency evacuation route procedures
- Natural disasters response

Reporting and notification procedures for emergencies; contacts, including offsite and local authorities:

- Alarm and communication systems
- Spill response, prevention, and control action plan
- Emergency response equipment
- Emergency personnel (response team) responsibilities and notification roster
- Training requirements

Construction Safety Programs

Motor Vehicle and Heavy Equipment Safety Program

- Operation and maintenance of vehicles
- Inspection
- Personal Protective Equipment
- Training

Forklift Operation Program

- Trained and certified operators
- Fueling operations
- Safe operating parameters
- Training

Excavation/Trenching Program

- Shoring, sloping, and benching requirements
- California Occupational Safety and Health Administration (Cal-OSHA) permit requirements
- Inspection
- Air monitoring
- Access and egress

Fall Protection Program

- Evaluation of fall hazards
- Protection devices
- Training

Scaffolding/Ladder Safety Program

- Construction and inspection of equipment
- Proper use
- Training

Articulating Boom Platforms Program

- Inspection of equipment

- Load ratings
- Safe operating parameters
- Operator training

Crane and Material Handling Program
- Certified and licensed operators
- Inspection of equipment
- Load ratings
- Safe operating parameters
- Training

Hazardous Waste Program
- Evaluation of hazard
- Training
- Air monitoring
- Medical surveillance
- Health and Safety Plan (HSP) preparation

Hot Work Safety Program
- Welding and cutting procedures
- Fire watch
- Hot work permit
- PPE
- Training

Employee Exposure Monitoring Program
- Exposure evaluation
- Monitoring requirements
- Reporting of results
- Medical surveillance
- Training

Electrical Safety Program
- Grounding procedure
- Lock-out/tag-out (LO/TO) procedures
- Overhead and underground utilities
- Utility clearance
- Training

Permit-Required Confined Space Entry Program
- Air monitoring and ventilation requirements
- Rescue procedures
- LO/TO and blocking, blinding, and blanking requirements
- Permit completion
- Training

Hand and Portable Power Tool Safety Program
- Guarding and proper operation
- Training

Housekeeping and Material Handling and Storage Program
- Storage requirements
- Walkways and work surfaces
- Equipment handling requirements
- Training

Hearing Conservation Program
- Identifying high-noise environments
- Exposure monitoring
- Medical surveillance requirements
- Hearing-protective devices
- Training

Back Injury Prevention Program
- Proper lifting and material handling procedures
- Training

Hazard Communication Program
- Labeling requirements
- Storage and handling
- Material Safety Data Sheets (MSDS)
- Chemical inventory
- Training

Respiratory Protection Program
- Selection and use
- Storage
- Fit testing
- Medical requirements
- Inspection and repair
- Training

Heat and Cold Stress Monitoring and Control Program
- Monitoring requirements
- Prevention and control

Pressure Vessel and Pipeline Safety Program
- Line-breaking program
- Equipment inspection and maintenance
- Blocking, bleeding, and blanking
- Training

5.16.4.4.2 Operations Health and Safety Program

Upon completion of construction and commencement of operations at Ivanpah SEGS, the construction safety and health program will transition into an operations-oriented program reflecting the hazards and controls necessary during operation. The following text outlines the topics that will be included in the Operations Health and Safety Program.

Injury and Illness Prevention Program

- Personnel with the responsibility and authority for implementing the plan
- Safety and health policy
- Work rules and safe work practices
- System for ensuring that employees comply with safe work practices
- Employee communications
- Identification and evaluation of workplace hazards

Methods and/or procedures for correcting unsafe or unhealthy conditions, work practices, and work procedures in a timely manner based on the severity of the hazards

- Specific safety procedures (see Plant Operation Safety Program)
- Training and instruction

Fire Protection and Prevention Program

- General requirements
- Fire hazard inventory, including ignition sources and mitigation
- Housekeeping and proper materials storage
- Employee alarm/communication system
- Portable fire extinguishers
- Fixed firefighting equipment
- Fire control
- Flammable and combustible liquid storage
- Use of flammable and combustible liquids
- Dispensing and disposal of liquids
- Training
- Personnel to contact for information on plan contents

Emergency Action Program/Plan (Part of the Risk Management Plan)

- Emergency escape procedures and emergency escape route assignments
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate
- Procedures to account for all employees after emergency evacuation has been completed
- Rescue and medical duties for those employees performing rescue and medical duties
- Fire and emergency reporting procedures
- Alarm and communication system
- Personnel to contact for information on plan contents
- Training requirements

Personal Protective Equipment Program

- Hazard analysis and prescription of PPE
- Personal protective devices
- Head protection
- Eye and face protection
- Body protection
- Hand protection
- Foot protection
- Skin protection

- Sanitation
- Safety belts and life lines for fall protection
- Protection for electric shock
- Medical services and first aid/bloodborne pathogens
- Respiratory protective equipment
- Hearing protection
- Training

Plant Operation Safety Program

Motor Vehicle and Heavy Equipment Safety Program

- Operation and maintenance of vehicles
- Inspection
- Personal Protective Equipment
- Training

Forklift Operation Program

- Trained and certified operators
- Fueling operations
- Safe operating parameters
- Training

Excavation/Trenching Program

- Shoring, sloping, and benching requirements
- Cal-OSHA permit requirements
- Inspection
- Air monitoring
- Access and egress

Fall Protection Program

- Evaluation of fall hazards
- Protection devices
- Training

Scaffolding/Ladder Safety Program

- Construction and inspection of equipment
- Proper use
- Training

Articulating Boom Platforms Program

- Inspection of equipment
- Load ratings
- Safe operating parameters
- Operator training

Crane and Material Handling Program

- Certified and licensed operators
- Inspection of equipment
- Load ratings
- Safe operating parameters

- Training

Hot Work Safety Program
- Welding and cutting procedures
- Fire watch
- Hot work permit
- Personal Protective Equipment
- Training

Workplace Ergonomics Program
- Identification of personnel at risk
- Evaluation of personnel
- Workplace and job activity modifications
- Training

Employee Exposure Monitoring Program
- Exposure evaluation
- Monitoring requirements
- Reporting of results
- Medical surveillance
- Training

Electrical Safety Program
- Grounding procedure
- LO/TO procedures
- Overhead and underground utilities
- Utility clearance
- Training

Permit-Required Confined Space Entry Program
- Air monitoring and ventilation requirements
- Rescue procedures
- LO/TO and blocking, blinding, and blanking requirements
- Permit completion
- Training

Hand and Portable Power Tool Safety Program
- Guarding and proper operation
- Training

Housekeeping and Material Handling and Storage Program
- Storage requirements
- Walkways and work surfaces
- Equipment handling requirements
- Training

Hearing Conservation Program
- Identifying high-noise environments
- Exposure monitoring
- Medical surveillance requirements

- Hearing protective devices
- Training

Back Injury Prevention Program
- Proper lifting and material handling procedures
- Training

Hazard Communication Program
- Labeling requirements
- Storage and handling
- MSDS
- Chemical inventory
- Training

Respiratory Protection Program
- Selection and use
- Storage
- Fit testing
- Medical requirements
- Inspection and repair
- Training

Heat and Cold Stress Monitoring and Control Program
- Monitoring requirements
- Prevention and control

Pressure Vessel and Pipeline Safety Program
- Line-breaking policy
- Equipment inspection and maintenance
- Blocking, bleeding, and blanking
- Communication
- Training

Safe Driving Program
- Inspection and maintenance
- Training

5.16.4.5 Safety Training Programs

To ensure that employees recognize and understand how to protect themselves from potential hazards during this project, comprehensive training programs for construction and operation will be implemented as indicated in Tables 5.16-5 and 5.16-6. Each of the safety procedures developed to control and mitigate potential site hazards will require some form of training. Training will be delivered in various ways, depending on the requirements of Cal-OSHA standards, the complexity of the topic, the characteristics of the workforce, and the degree of risk associated with each of the identified hazards.

Tables 5.16-5 and 5.16-6 summarize the safety training programs that will be provided to construction and operations personnel, respectively.

TABLE 5.16-5
Construction Training Program

Training Course	Target Employees
Injury and Illness Prevention Training	All
Emergency Action Program/Plan	All
Personal Protective Equipment Training	All
Motor Vehicle and Heavy Equipment Safety Training	Employees working on, near, or with heavy equipment or vehicles
Forklift Operation Training	Employees operating forklifts
Excavation/Trenching Safety Training	Employees involved with trenching or excavation
Fall Protection Training	Employees working at heights greater than 6 feet or required to use fall protection
Scaffolding/Ladder Safety Training	Employees required to erect or use scaffolding
Crane Safety Training	Employees supervising or performing crane operations
Fire Protection and Prevention Training	Employees responsible for the handling and storage of flammable or combustible liquids or gases
Hazard Communication Training	Employees handling or working with hazardous materials
Hazardous Waste	Employees handling or excavating hazardous waste
Hot Work Safety Training Fire Prevention and Protection Training	Employees performing hot work
Electrical Safety Training	Employees performing LO/TO or working on systems that require LO/TO activities
Electrical Safety Training	Employees required to work on electrical systems and equipment, or use electrical equipment and cords
Permit-Required Confined-Space Entry Training	Employees required to supervise or perform confined-space entry activities
Hand and Portable Power Tool Safety Training	Employees that will be operating hand and portable power tools
Heat Stress and Cold Stress Safety Training	Employees that are exposed to temperature extremes
Hearing Conservation Training	All
Back Injury Prevention Training	All
Safe Driving Training	Employees supervising or driving motor vehicles
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized systems or equipment
Respiratory Protection Training	All employees required to wear respiratory protection
Fire Protection and Prevention Training	All

TABLE 5.16-6
Operations Training Program

Training Course	Target Employees
Injury and Illness Prevention Training	All
Emergency Action Plan	All
Personal Protective Equipment Training	All
Excavation/Trenching Safety Training	Employees involved with trenching or excavation
Scaffolding/Ladder Safety Training	Employees required to erect or use scaffolding
Fall Protection Training	Employees required to use fall protection
Forklift Operator Training	Employees operating forklifts
Crane Safety Training	Employees supervising or performing crane operations
Workplace Ergonomics	Employees performing repetitive activities
Fire Protection and Prevention Training	Employees responsible for the handling and storage of flammable or combustible liquids or gasses
Hot Work Safety Training	Employees performing hot work
Electrical Safety Training	Employees performing LO/TO
Electrical Safety	Employees required to work on electrical systems and equipment
Permit-required Confined-space Entry	Employees required to supervise or perform confined-space entry
Hand and Portable Power Tool Safety Training	Employees that will be operating hand and portable power tools
Heat Stress and Cold Stress Safety Training	Employees exposed to temperature extremes
Hearing Conservation Training	All
Back Injury Prevention Training	All
Safe Driving Training	Employees supervising or driving motor vehicles
Hazard Communication Training	Employees handling or working around hazardous materials
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized systems or equipment
Respiratory Protection Program	All employees required to wear respiratory protection
Fire Protection and Prevention Training	All

5.16.4.6 Fire Protection

Ivanpah SEGS is within the jurisdiction of San Bernardino County Station #53 in Baker, California, which provides fire services in the area to the State border. Their approximate response time is 45 minutes. Station #53 has a Type 1 engine and a brush patrol vehicle. They have 3 staff on duty at all times (1 captain, 1 engineer, and 1 firefighter). San

Bernardino County Fire Department also has a Mutual Aid Agreement with Clark County (Nevada) Fire Department for responses requiring more assistance.

5.16.4.7 Emergency Response

Because of the highly remote and rural area of Ivanpah SEGS, services are limited and spread out. San Bernardino County Firefighters receive specialized training to address emergency responses to industrial hazards. The response time to the project site, with full resources capabilities, would be 3 to 4 hours. There are roughly 150 members (10 Registered Environmental Health Specialists and the rest firefighters) and the organization is a full Level A response team, capable of handling all types of Chemical, Biological, Radiological, and Nuclear responses. Hazardous materials service is provided out of the County station in Fontana, Station #78.

Law enforcement is provided by the San Bernardino County Sheriff. The closest county sheriff location to the project site would be the Baker Resident Post. Two deputies staff this post and there is at least one officer available to respond to calls 24 hours a day. Response time would be the drive time from the City of Baker to the Project site. (approximately 45 minutes).

5.16.4.8 Hospitals

Ambulance service is provided by Baker Ambulance Medical Service, Station #53.

The closest hospitals with an emergency room are Saint Rose in Henderson, CA and University Medical Center, Las Vegas (UMCLV). Saint Rose is approximately 40 miles from the proposed project site. Specialty services at the hospital include intensive care unit, emergency/trauma, labor and delivery, cardiac care, orthopedics, surgery, and transplant. University Medical Center is approx. 50 miles distant and roughly 55 minutes drive time. This is a fully staffed teaching hospital, serving the medical needs of southern Nevada and parts of California, and Arizona.

5.16.5 Involved Agencies and Agency Contacts

Several agencies are involved to ensure protection of worker health and safety. Agency contacts relative to worker health and safety and fire are shown in Table 5.16-7.

TABLE 5.16-7
Agency Contacts for Worker Safety

Issue	Agency	Contact
Fire Suppression	County of San Bernardino Fire Department	Dan Tellez, Captain Station #53 Fire Department P.O. Box 660 65 Kingston Circle Baker, CA 92309 (760) 733-4026 dtellez@sbcfire.org

TABLE 5.16-7
Agency Contacts for Worker Safety

Issue	Agency	Contact
Hazardous Materials Incidents	County of San Bernardino Fire Department	Joe Ashbaker, Supervisor, Hazardous Materials Division 620 South "E" Street San Bernardino, CA 92415 (909) 386-8430 jashbaker@sbcfire.org
Law Enforcement	County of San Bernardino Sheriff's Department	Doug Hubbard, Administrative Sergeant 225 East Mt. View Barstow, CA 92311 760-256-4838 dhubbard@sbcsd.org
Public Health	County of San Bernardino Department of Public Health	Eric Frykman, Heath Officer 351 N. Mt. View Avenue San Bernardino, CA 92415-0010 909-387-6218 efrykman@dph.sbcounty.gov
Code Enforcement	County of San Bernardino Land Use Services, Building Permits & Code Enforcement	Julie Rynerson-Rock, Director County of San Bernardino 385 N. Arrowhead Avenue 1st Floor San Bernardino, CA 92415-0182 (909) 387-8311 jrynerson@lusd.sbcounty.gov
Safety Compliance	Cal-OSHA – District Office	Andy Morita District Manager Cal-OSHA (District Office) 464 West 4th Street, Suite 332 San Bernardino, CA 92401 (909) 383-4321 amorita@dir.ca.gov
Pressure Vessel Compliance	Cal-OSHA Pressure Vessel Unit	Gary Teel Senior Pressure Value Engineer Santa Ana Pressure Vessel District Office Suite 215 2000 E. McFadden Ave Santa Ana, CA 92705 (714) 567-7208 gteel@dir.ca.gov

5.16.6 Permits Required and Permit Schedule

Table 5.16-8 lists applicable permits related to the protection of worker health and safety for Ivanpah SEGS certification. The activities covered and application requirements to obtain each permit are provided.

All permits noted in Table 5.16-8 may be obtained from any Cal-OSHA district or field office as needed. Notification requirements are listed as 24 hours because the permits may be

required at several points in the construction of the plant or during operations; no specific permitting schedule is provided.

TABLE 5.16-8
Permits and Permit Schedule

Permit	Agency Contact	Schedule
Trenching and excavation permit	Any Cal-OSHA district or field office	Submit completed permit application to any Cal-OSHA district or field office prior to commencing construction.
Permit to erect a fixed tower crane	Any Cal-OSHA district or field office	Submit completed permit application to any Cal-OSHA district or field office at least 24 hours prior to initiation of activity.